

INDEX

- Air filters, 6-37
- Air vents
 - Description of, 4-47
 - Installation and operation of, 4-48
 - Maintenance of, 4-49
 - Typical operating difficulties with, 4-50
- Automatic controls
 - Barometric dampers, 7-13
 - Combustion safeguards, 7-13
 - Draft controllers, 7-13
 - Electric, 7-1
 - Electronic, 7-1
 - Fan and limit control, 7-11
 - Feedwater regulators, 7-13
 - For coal stoker, 7-8
 - For gas burner, 7-10
 - For hand-fired coal furnace, 7-7
 - For hot water boiler, 7-11
 - For oil burner, 7-9
 - For steam boiler, 7-11
 - For warm-air furnace, 7-11
 - Low-water cutoffs, 7-13
 - Operation and maintenance of, 7-5, 7-6, 7-7
 - Pilotstat, 7-12
 - Pneumatic, 7-1
 - Primary type, 7-3, 7-7, 7-8, 7-9, 7-10
 - Safety pilot, 7-12
 - Smoke alarms, 7-13
 - Thermostats, 7-2, 7-6
 - Types of, 7-1
- Automatic vent dampers, 6-25
- Blow-down pipes, 4-42
- Boilers
 - Burners for. See Burners
 - Cast iron, 4-7
 - Cleaning, initial, 4-11
 - Condensate pumps. See Pumps, condensate
 - Controls for. See Automatic controls
 - Fire-tube, 4-9
 - Installation of, 4-13, 4-15, 4-32, 4-38
 - Lay-up of. See Summer lay-up
 - Maintenance of, 4-12, 4-14, 4-17, 4-34, 4-39, 4-71, 4-72, 4-73, 4-74, 4-75, 4-76
 - Operation of. See also Steam heating systems, Operating difficulties, 4-11, 4-18, 4-34, 4-41, 4-71, 4-72, 4-73, 4-74
 - Return traps, 4-15, 4-16, 4-17, 4-18
 - Safety valves, 4-41
 - Steel, 4-8, 4-9, 4-10
 - Vacuum pumps. See Pumps, vacuum
 - Water-tube, 4-10
- Burners, coal. See Stoker, coal; Furnaces, coal-fired
- Burners, dual fuel (oil/gas)
 - Introduction to, 3-20
 - Maintenance of, 3-22
 - Operation of, 3-21
- Burners, gas
 - Introduction to, 3-15
 - Maintenance of, 3-19
 - Mechanical-mixing type, 3-17
 - Operation of, 3-17, 3-18
 - Radiant type, 3-17
 - Register type, 3-17
 - Up-shot type, 3-17
- Burners, general
 - Air adjustment to, 3-23
 - Controls for. See Automatic controls
 - Energy conservation measures for, 3-23
 - Retrofit of, 3-23
 - Tuning of, 3-23
- Burners, oil
 - High pressure gun, 3-10
 - Horizontal rotary, 3-10
 - Ignition procedures for, 3-11
 - Low pressure gun, 3-10
 - Maintenance of, 3-13
 - Operation of, 3-12
 - Piping for, 3-14
 - Starting of, 3-11
 - Troubleshooting of, 3-13
- Coal, 2-1
- Coal-fired boilers. See Boilers; Stokers, coal
- Coal stoker. See Stoker, coal
- Controls. See Automatic controls
- Dampers, combustion air, 4-43, 6-9
- Dual fuel (oil/gas) burners. See Burners, dual fuel (oil/gas)
- Energy conservation
 - Air adjustment to burners, 3-23
 - Hot water temperature reduction, 5-18

TM 5-642

- Isolation of off-line boilers, 4-99
- Night setback of hot water supply temperature, 5-19
- Maintenance of duct insulation, 6-42
- Maintenance of pipe and boiler insulation, 4-100
- Space temperature setback, 6-41
- Fan-coils, hot-water
 - Capacity control for, 5-11
 - Electrical requirements for, 5-12
 - Description of, 5-10
 - Maintenance of, 5-13
- Furnaces, coal-fired
 - Cast iron, 6-6
 - Chimney for, 6-10
 - Hand-fired, 3-6, 3-7, 3-8
 - Motor damper, 6-9
 - Ratings, 6-7
 - Smokepipe for, 6-8
 - Steel, 6-5
- Furnaces, gas
 - Construction of, 6-15
 - Conversion to, 6-20
 - Downflow, 6-18
 - Fully-condensing, 6-21, 6-22
 - Horizontal, 6-19
 - Pulse combustion, 6-23, 6-24
 - Rating, 6-16
 - Types of, 6-14
 - Upflow, 6-18
- Furnaces, general
 - Burners for. See Burners
 - Controls for. See Automatic controls
 - Introduction to, 6-1
 - Ratings, 6-4
- Furnaces, oil
 - Conversion to, 6-13
 - Description of, 6-11, 6-12
- Gas-conversion furnaces, 6-20
- Gas-fired boilers. See Boilers
- Gas-fired unit heaters. See Unit heaters, gas-fired
- Gas-fired warm-air furnaces. See Furnaces, gas
- Gauges
 - Glass breakage, 4-37
 - Glasses, installation of, 4-38
 - Steam pressure, 4-40
 - Testing and care of, 4-39
- Gravity systems. See Hot water heating systems; Steam heating systems; Warm-air heating systems
- Heat exchangers
 - Description of, 5-14
 - Installation of, 5-15
 - Operation of, 5-16
 - Maintenance of, 5-17
- Heating coils, steam
 - Description of, 4-59
 - Initial operation and cleaning of, 4-61
 - Installation of, 4-60
 - Maintenance of, 4-62
 - Typical operating difficulties with, 4-63
- Horizontal furnaces. See Furnaces, gas
- Hot-water fan-coil units. See Fan-coils, hot-water
- Hot-water heating systems. See also Boilers
 - Direct return, 5-8
 - Expansion tanks, 5-2, 5-7
 - Gravity, 5-1, 5-2, 5-3, 5-4, 5-5
 - Inspection and maintenance of, 5-5, 5-9
 - Piping for, 5-8
 - Pressure reducing valve for, 5-7
 - Pumps, 5-7
 - Radiator air vent, 5-2
 - Radiator valve, 5-2
 - Reversed return, 5-8
 - Series-loop, 5-8
 - Water level, 5-4
- Humidifiers, steam
 - Ducat installation of, 4-65
 - Description of, 4-64
 - Unit type, installation of, 4-66
- Infrared heaters
 - Electric, 6-31
 - Gas-fired, 6-30
 - Maintenance of, 6-34
 - Oil-fired, 6-32
 - Precautions for, 6-33
- Liquefied petroleum gas (LPG)
 - Characteristics of, 2-9
 - Description of, 2-8
 - Specifications for, 2-10
 - Butane and iso-butane, 2-10
 - Propane, 2-10
 - Handling precautions for, 2-11
 - Installation of, 2-11
 - Piping for, 2-11

- Storage of, 2-11
- Limit control. See Automatic controls
- Maintenance
 - Of air filters, 6-37
 - Of air vents, 4-49
 - Of automatic controls, 7-5, 7-6, 7-7
 - Of blowers, 6-36
 - Of boilers, 4-7, 4-12
 - Of burners, dual fuel (oil/gas), 3-22
 - Of burners, gas, 3-19
 - Of burners, oil, 3-13
 - Of coils, steam, 4-62, 4-63
 - Of duct insulation, 6-42
 - Of furnaces, 6-22, 6-24
 - Of gauge glasses, 4-37, 4-38, 4-39
 - Of humidifiers, 6-38
 - Of infrared heaters, 6-34
 - Of pipe and boiler insulation, 4-100
 - Of pressure reducing valves, 4-69, 4-70
 - Of pumps, 4-22, 4-29
 - Of radiators, 4-53, 4-54
 - Of return traps, 4-17
 - Of steam traps, 4-45, 4-46
 - Of stokers, coal, 3-3, 3-4, 3-5
 - Of unit heaters, steam, 4-57
 - Of valves and piping, 4-14, 4-72
 - Of water level, 4-73
 - Of water level regulators, 4-34
- Natural gas
 - Description of, 2-5
 - Handling and storage of, 2-6
 - Handling precautions for, 2-7
- Oils, fuel
 - Classification of, 2-3
 - Commercial grades of, 2-3
 - Diesel, 2-3
 - Distillate, 2-3
 - Residual, 2-3
 - Tanks for, 2-4
- Operation
 - Of air vents, 4-48, 4-50
 - Of automatic controls, 7-5, 7-6, 7-7
 - Of boilers, 4-11, 4-18, 4-34, 4-41, 4-71, 4-72, 4-73, 4-74
 - Of burners, dual fuel (oil/gas), 3-21
 - Of burners, gas, 3-17, 3-18
 - Of burners, oil, 3-12
 - Of coal stokers, 3-3, 3-5
 - Of infrared heaters, 6-33
 - Of pressure reducing valves, 4-68, 4-69, 4-70
 - Of pumps, 4-21, 4-23, 4-28, 4-30
 - Of radiators, 4-53, 4-54
 - Of steam traps, 4-45, 4-46
 - Of unit heaters, steam, 4-58
 - Of water level regulators, 4-33, 4-34, 4-35
- Pumps, condensate
 - Alignment of, 4-20
 - Controls for, 4-20
 - Description of, 4-19
 - Foundation for, 4-20
 - Fuses and thermal units for, 4-20
 - Installation of, 4-20
 - Maintenance of, 4-22
 - Operation of, 4-21, 4-23
 - Packing boxes, 4-22
 - Piping for, 4-20
 - Rotation, 4-20
 - Wiring, 4-20
- Pumps, vacuum
 - Cleaning of, initial, 4-28
 - Controls for, 4-27
 - Description of, 4-25
 - Installation of, 4-26
 - Lubrication of, 4-29
 - Maintenance of, 4-29
 - Packing boxes, 4-29
 - Operation of, 4-28, 4-30
- Pressure reducing valves
 - Types of, 4-67
 - Installation of, 4-68
 - Operation and maintenance of, 4-68, 4-69
 - Typical operating difficulties with, 4-70
- Pulse combustion furnaces. See Furnaces, gas
- Radiators, steam
 - Description of, 4-51
 - Initial operation and cleaning of, 4-53
 - Installation of, 4-52
 - Typical operating difficulties with, 4-54
- Safety valves, 4-41
- Steam heating systems. See also Boilers
 - Description of, 4-1, 4-2
 - Gravity, one-pipe, 4-3
 - Energy conservation measures for, 4-99, 4-100, 4-101
 - Operating difficulties with, 4-77, 4-78, 4-79, 4-80, 4-81, 4-82, 4-83, 4-84, 4-85, 4-86, 4-87

- Summer lay-up procedures for. See Summer lay-up
- Two-pipe, vacuum, 4-6
- Two-pipe, with condensate pump, 4-5
- Two-pipe, with return trap, 4-4
- Steam pressure pumping systems, 4-24
- Steam traps
 - Boiler return. See Boilers, Return traps
 - Bucket, 4-46
 - Cleaning of, 4-46
 - Description of, 4-44
 - Float, 4-46
 - Installation of, 4-45, 4-46
 - Leak detection for, 4-101
 - Maintenance of, 4-45, 4-46
 - Operation of, 4-45, 4-46
 - Thermostatic, 4-45, 4-46
- Stokers, coal
 - Cleaning of, 3-3
 - Draft requirements for, 3-3
 - Fire requirements for, 3-3
 - Inspection and maintenance procedures for, 3-4
 - Lay-up of, 3-3, 4-9
 - Lubrication of, 3-3
 - Operation of, 3-3
 - Single-retort underfeed, 3-2
 - Troubleshooting, 3-5
 - Types of, 3-1
- Summer lay-up
 - Cleaning, boiler 4-90
 - Draining, heating system, 4-89
 - Of cast iron boilers, 4-7, 4-90
 - Of controls and electrical connections, 4-97
 - Of gas burners, 4-93
 - Of oil burners, 4-92
 - Of pumps, 4-94
 - Of stack and breeching, 4-98
 - Of steam traps, 4-96
 - Of steel boilers, 4-90
 - Of stokers, 4-91
 - Of valves and strainers, 4-95
- Thermostats. See Automatic controls
- Unit heaters, gas-fired
 - Description of, 6-27
 - Installation of, 6-29
 - Introduction to, 6-26
 - Operation of, 6-28
- Unit heaters, steam
 - Description of, 4-55
 - Installation of, 4-56
 - Maintenance of, 4-57
 - Typical operating difficulties with, 4-58
- Warm-air heating systems. See also Furnaces
 - Air filters for, 6-37
 - Blower and limit control for, 6-39
 - Blower and motor maintenance with, 6-36
 - Ceiling delivery, 6-3
 - Central fan delivery, 6-3
 - Forced, 6-3
 - Gravity, 6-2
 - Humidifiers, 4-64, 4-65, 4-66
 - Inside wall delivery, 6-3
 - Outside wall delivery, 6-3
 - Perimeter delivery, 6-3
- Water level regulators
 - Description of, 4-31
 - Installation of, 4-32
 - Maintenance of, 4-34
 - Operation of, 4-33, 4-34
 - Servicing of, initial, 4-33
 - Typical operating difficulties with, 4-35